Answer Key -- Water Resources

Chapter 3 · Geography

Reading Guide · Glossary · Comprehension · Practice Questions · 10 Puzzles

NCERT Companion Workbook · Based on “Contemporary India II, Geography, NCERT Class X”

Comprehension Questions -- Answered

Q1. Why can a region with high rainfall still suffer from water scarcity?

Answer: Scarcity often comes from over-exploitation, unequal access and pollution rather than from a lack of rainfall itself. A city can receive plenty of precipitation yet still run short if its water is heavily polluted or if demand from a large population outpaces supply. The chapter stresses that scarcity is as much a social and economic problem as a natural one.

Q2. What role does growing population and industrialisation play in water scarcity?

Answer: A larger population needs more water for both domestic use and food production, which pushes farmers to expand irrigation and over-draw groundwater. Rapid industrialisation adds further demand, since industries are heavy water users and also need power that is often generated using water. Together these pressures have caused falling groundwater levels in many Indian cities.

Q3. What benefits do multi-purpose river projects offer, and what problems have they caused?

Answer: These projects combine irrigation, hydroelectric power, flood control, domestic water supply and even navigation within a single dam scheme, which is why they are called multi-purpose. However, damming rivers disrupts natural sediment flow, harms aquatic habitats, and has sometimes triggered earthquakes, water-borne disease and even worsened flooding through reservoir sedimentation. The chapter presents both sides rather than treating dams as purely beneficial.

Q4. How does rooftop rainwater harvesting work in a place like Shillong?

Answer: Rain falling on sloped rooftops is channelled through pipes into storage systems at the household level, even though Shillong sits near some of the wettest places on earth. Nearly every household in the city has adopted this structure because, despite the high rainfall, the area still faces water shortages. It supplies a notable share of each household's total water need.

Q5. Describe how a tanka stores and supplies drinking water in Rajasthan.

Answer: A tanka is an underground tank, often built inside a house or courtyard, connected to the sloping roof by a pipe that carries rainwater down after the first, unclean spell of rain is discarded. The stored rainwater, known locally as palar pani, can then be drawn on through the dry months when other sources fail. Some households even built cool underground rooms beside their tanka to escape summer heat.

Q6. What is the purpose of the Jal Jeevan Mission?

Answer: The Jal Jeevan Mission aims to give every rural household a reliable, piped supply of safe drinking water at a guaranteed minimum daily amount. It focuses on functional, long-term tap connections rather than one-time provision. The chapter presents it as a government response to persistent rural water access problems.

Q7. How did dams built to control floods sometimes end up worsening them?

Answer: Sediment that would normally flow downstream instead settles at the bottom of a dam's reservoir over time, gradually reducing its capacity to hold back water. When heavy rainfall arrives, a reservoir already full of built-up sediment cannot absorb the excess flow it was designed for. Ironically, this means some flood-control dams have themselves contributed to flooding downstream.

Q8. What ecological problems can result from damming and regulating rivers?

Answer: Regulating a river's flow disrupts natural sediment movement, leading to rockier stream beds and poorer aquatic habitats. Dams also fragment rivers, making it harder for aquatic species to migrate for spawning, while submerged vegetation in reservoirs decomposes over time. These changes show that a project built for human benefit can still carry a real ecological cost.

Short-Answer Practice -- Model Answers

Q1. Name one traditional rainwater harvesting structure used in Rajasthan's semi-arid regions.

Answer: A khadin or a johad.

Reasoning: *These structures let rainwater stand on the field long enough to soak into the soil, which suits a region where rainfall is scarce and unpredictable.*

Q2. Which two states benefit from the Sardar Sarovar project's irrigation?

Answer: Primarily Gujarat and Rajasthan, with some benefit to Maharashtra.

Reasoning: *The project channels Narmada river water specifically to drought-prone command areas in these states that have few alternative irrigation sources.*

Q3. Why is river water considered a renewable resource despite scarcity concerns?

Answer: Because it is continuously replenished through the hydrological cycle.

Reasoning: *Precipitation, surface runoff and groundwater recharge keep replacing the water that is drawn out, unlike a finite mineral deposit that cannot regenerate.*

Q4. What made rooftop rainwater harvesting decline in parts of western Rajasthan in recent decades?

Answer: The arrival of perennial canal water from the Indira Gandhi Canal.

Reasoning: *Once canal water became easily available, many households had less pressing need to maintain their traditional tankas, even though some kept them for taste preference.*

Q5. Why are dams sometimes called the 'temples of modern India'?

Answer: Because Jawaharlal Nehru used that phrase to describe them.

Reasoning: *He believed integrating irrigation, power generation and industrial growth through dams would help drive the newly independent country's development.*

Objective Practice

A. Multiple Choice Questions

1. A region with high annual rainfall but a large population is likely to be:

a) Free from water scarcity

✓ **b) Suffering from water scarcity**

c) Unaffected by population size

d) Immune to pollution

2. Which of the following is NOT usually presented as an argument in favour of multi-purpose river projects?

a) They bring water to scarcity-hit areas

b) They help control floods

✓ **c) They cause large-scale displacement**

d) They generate electricity

3. Underground tanks called tankas are especially associated with which region?

a) Coastal Kerala

✓ **b) Semi-arid western Rajasthan**

c) The Gangetic plains

d) The Western Ghats

4. Meghalaya's traditional drip irrigation system uses pipes made of which material?

a) Clay

✓ **b) Bamboo**

c) Iron

d) Plastic

5. The Sardar Sarovar Dam has been built on which river?

✓ **a) Narmada**

b) Godavari

c) Krishna

d) Mahanadi

6. Rainwater stored in Rajasthan's tankas is locally referred to as:

a) Khadin pani

b) Johad pani

✓ **c) Palar pani**

d) Kul pani

7. Which government mission aims to give rural households assured piped drinking water?

a) Atal Bhujal Yojana

✓ **b) Jal Jeevan Mission**

c) Pradhan Mantri Krishi Sinchayee Yojana

d) Digital India

8. Gendathur, a village noted for rooftop rainwater harvesting, is located in which state?

a) Rajasthan

✓ **b) Karnataka**

c) Meghalaya

d) Gujarat

9. Diversion channels called guls or kuls are traditionally found in which region?

a) The Thar desert

✓ **b) The Western Himalayas**

c) The Deccan plateau

d) The Gangetic delta

10. Which state made rooftop rainwater harvesting structures compulsory by law?

a) Kerala

b) Rajasthan

✓ **c) Tamil Nadu**

d) Karnataka

B. True or False

1. Three-fourths of the earth's surface is covered with water, but only a small share of it is usable freshwater. -- TRUE

2. Water scarcity occurs only in regions that receive low rainfall. -- FALSE

3. Multi-purpose projects integrate irrigation, power generation and flood control together. -- TRUE

4. Damming rivers has no effect on sediment flow or aquatic habitats. -- FALSE

5. Khadins and johads are traditional water harvesting structures associated with Rajasthan. -- TRUE

6. Rooftop rainwater harvesting is common in Shillong despite the region's very high rainfall. -- TRUE

7. The Atal Bhujal Yojana focuses mainly on urban flood control rather than groundwater management. -- FALSE

8. Irrigated agriculture is described as the largest consumer of water resources. -- TRUE

C. Match the Following

Column A	Column B
1. Tanka	a) Underground tank for storing rooftop rainwater
2. Khadin	b) Diversion channel used in the Western Himalayas
3. Kul or gul	c) Deposit of silt that lowers a reservoir's capacity
4. Bamboo drip system	d) Traditional irrigation method used in Meghalaya
5. Sardar Sarovar Dam	e) Rain-fed field structure that moistens soil
6. Jal Jeevan Mission	f) Multi-purpose project built on the Narmada river
7. Sedimentation	g) Excess salt build-up caused by over-irrigation
8. Salinisation	h) Scheme for piped drinking water to rural homes

Answers: 1-a, 2-e, 3-b, 4-d, 5-f, 6-h, 7-c, 8-g

Higher-Order Thinking (HOTS) Questions -- Model Answers

Q1. The chapter shows dams both preventing and causing floods. How can excessive sedimentation in a reservoir turn a flood-control structure into a flood risk?

Answer: As a river's sediment settles at the bottom of a dam's reservoir instead of flowing downstream, the reservoir gradually loses the storage capacity it needs to absorb sudden heavy rainfall. Once that buffer capacity shrinks, excess water has nowhere to go during an intense monsoon spell, and the dam can no longer perform the flood-control role it was built for. This shows that a structure's benefits can erode over time even without any change in the rainfall pattern itself.

Q2. Why might traditional rainwater harvesting be a more sustainable option for water-scarce hill towns like Shillong than building a large dam?

Answer: Rooftop harvesting captures water at the household level exactly where it falls, without disturbing a river's natural flow, sediment transport or aquatic habitats the way a large dam would. It also requires far less capital investment and avoids the displacement and ecological disruption associated with reservoir construction. For a town

with heavy but locally uneven rainfall, matching supply to demand at the household scale can be more resilient than relying on a single large, centralised structure.

Q3. Compare how the reasons for water scarcity differ between a drought-prone desert village and a densely populated city with adequate rainfall.

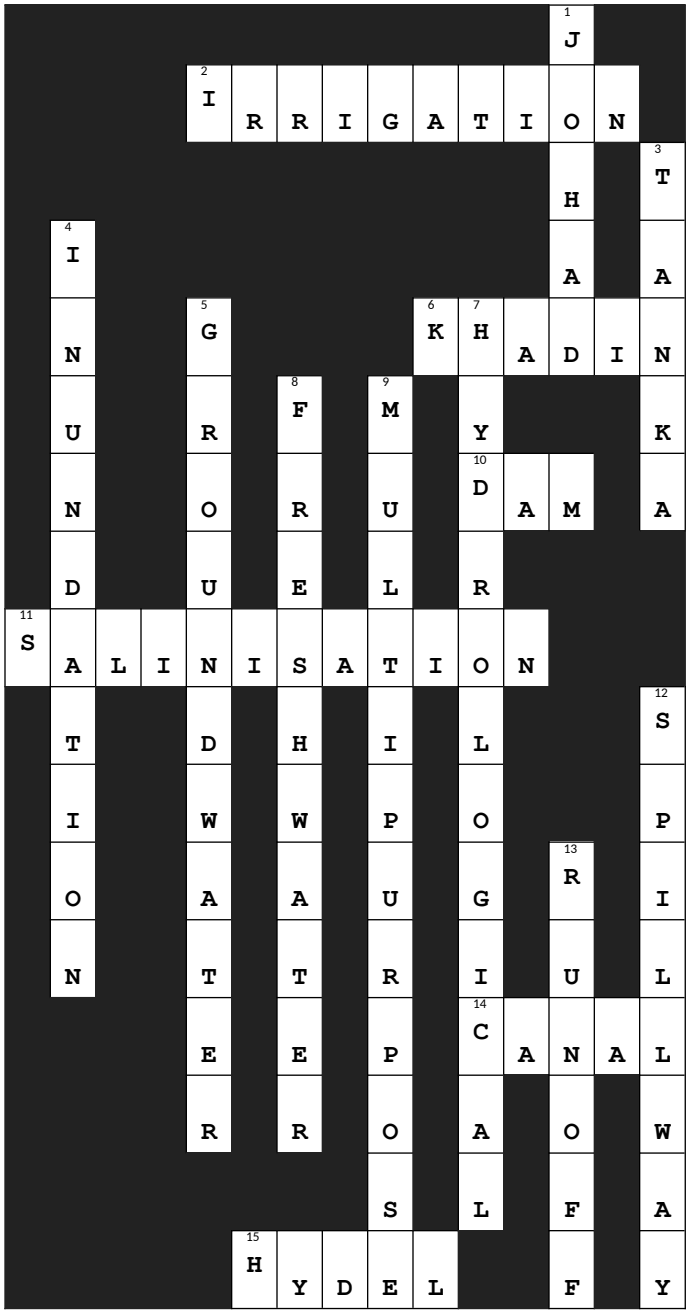
Answer: A desert village's scarcity usually stems directly from low and unreliable rainfall combined with limited groundwater recharge, which is why khadins and johads evolved there to capture whatever rain does fall. A city with adequate rainfall instead usually faces scarcity from over-exploitation by a large population, industrial demand and pollution of existing supplies. The underlying cause differs even though both places end up facing a shortage of usable water.

Q4. What trade-offs would a state government have to weigh before starting a new multi-purpose river project today, given the concerns raised in the chapter?

Answer: A government would need to weigh the promised gains in irrigation, power and flood control against the risk of ecological damage such as disrupted sediment flow, harmed aquatic life and the possibility that sedimentation could eventually undermine the project's own flood-control benefit. It would also have to consider the social cost of any displacement caused by the reservoir. Increasingly, planners might compare these trade-offs against decentralised alternatives like rainwater harvesting, which the chapter presents as viable for meeting some of the same water needs.

Puzzle Pack -- 10 Puzzles for This Chapter

1. Crossword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2 I R R I G A T I O N
3 T
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4 I
A A
5 G
6 K
7 H A D I N
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8 F
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U R Y K
10 D
N O R U A M A
D U E L R
11 S A L I N I S A T I O N
12 S
T D H I L
I W W P O P
13 R
O A A U G I
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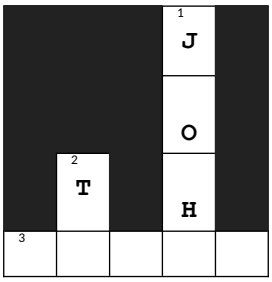
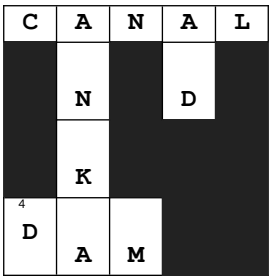
2. Mini Crossword





3. Word Search

C	M	U	L	T	I	P	U	R	P	O	S	E	B	M
A	B	Q	T	N	E	M	K	N	A	B	M	E	O	A
N	I	G	N	I	T	S	E	V	R	A	H	V	T	D
A	S	A	L	I	N	I	S	A	T	I	O	N	C	L
L	H	N	F	R	E	S	H	W	A	T	E	R	A	F
G	R	O	U	N	D	W	A	T	E	R	N	C	L	R
Y	S	I	K	O	R	V	U	W	D	O	I	O	E	K
T	S	T	H	S	S	C	F	R	I	G	O	S	R	Y
I	E	A	A	C	D	Q	O	T	O	D	E	A	F	A
C	D	D	D	O	W	U	A	L	P	R	I	H	F	W
R	I	N	I	N	G	G	O	L	V	N	H	Y	O	L
A	M	U	N	H	I	R	A	O	F	N	W	D	N	L
C	E	N	T	R	D	I	I	A	S	Z	M	E	U	I
S	N	I	R	Y	N	R	L	Q	D	I	E	L	R	P
C	T	I	H	D	S	L	W	B	A	M	B	O	O	S

4. Cryptogram

Encoded: ZSGUSPFH MAZJWZ PTRPG FX SXTZWUOW GTR ZJGUW WOWUH RUXM XY IGFWU.

Plain: Scarcity pushes India to conserve and share every drop of water.

Key: A=U B=G C=X D=Q E=K F=T G=A H=Y I=W J=H K=L L=B M=P N=J O=V P=I Q=Z R=D S=C T=N U=R V=M W=E X=O Y=F Z=S

5. Caesar Coded Message

Encoded: IMFQD DQEAGDOQE. EOMDOUFK BGETQE UZPUM FA OAZEQDHQ MZP ETMDQ QHQDK PDAB AR IMFQD.

Plain: Water Resources. Scarcity pushes India to conserve and share every drop of water.

Shift: 12

6. Word Scramble

1. RRIGITIAON → IRRIGATION

2. SIIINNATSOLA → SALINISATION

3. RRADGNUTEOW → GROUNDWATER

4. FRUFON → RUNOFF

5. KIDHNA → KHADIN

6. ANIFODPLLO → FLOODPLAIN

7. KNAAT → TANKA

8. HLEDY → HYDEL

9. DOAJH → JOHAD

10. IRFANLLA → RAINFALL

7. Acrostic

R -- RESERVOIR

A -- HYDROLOGICAL

I -- IRRIGATION

N -- GROUNDWATER

W -- FRESHWATER

A -- SCARCITY

T -- TANKA

E -- EMBANKMENT

R -- ROOFTOP

Theme: RAINWATER

8. Match the Pairs

A → 3

B → 1

C → 7

D → 4

E → 2

F → 8

G → 6

H → 5

9. Fill in the Blanks

1. Excess salt build-up in over-irrigated soil is known as _____. → SALINISATION

2. A shortage of water relative to people's needs is known as water _____. → SCARCITY

3. Water that seeps beneath the earth's surface and is later drawn up is called _____. → GROUNDWATER

4. A prolonged period of abnormally low rainfall is called a _____. → DROUGHT

5. A project combining irrigation, power and flood control is called a _____ project. → MULTIPURPOSE

6. A rain-fed field structure used to moisten soil in Jaisalmer is called a _____. → KHADIN

7. In Rajasthan, rooftop rain is stored in an underground tank called a _____. → TANKA

8. Meghalaya's centuries-old system uses _____ pipes to deliver water drop by drop. → BAMBOO

10. Odd One Out

1. Spillway -- part of a modern dam, not a traditional harvesting method

2. Salinisation -- a problem caused by water use, not a water source

3. Poaching -- unrelated to the purposes of a multi-purpose project

4. Reservoir -- built behind a large modern dam, not a traditional method